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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P31872-P0	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/JP 03/13797	International filing date (day/month/year) 28.10.2003	Priority date (day/month/year) 30.10.2002
International Patent Classification (IPC) or both national classification and IPC G11B27/32		
Applicant MATSUSHITA ELECTRIC INDUSTRIAL CO.,LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 13 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 24.05.2004	Date of completion of this report 25.01.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Sucher, R Telephone No. +49 89 2399-2148 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/JP 03/13797

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1-3, 8-38 as originally filed
4, 4a, 5, 6, 6a, 7, 7a received on 22.11.2004 with letter of 22.11.2004

Claims, Numbers

1-14 received on 22.11.2004 with letter of 22.11.2004

Drawings, Sheets

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/JP 03/13797**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-14
	No: Claims	
Inventive step (IS)	Yes: Claims	1-14
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-14
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: PATENT ABSTRACTS OF JAPAN vol. 1999, no. 08, 30 June 1999 & JP 11 086512 A (NEC CORP), 30 March 1999;

D2: PATENT ABSTRACTS OF JAPAN vol. 1998, no. 08, 30 June 1998 & JP 10 083658 A (SONY CORP), 31 March 1998.

2. Document D1 discloses (see the abstract and par. 0018-0023 in conjunction with fig. 3) a recording method for recording data into an information recording medium (rewriting type optical disk), wherein the number of rewrites into the same area is limited, comprising

performing a search for unallocated areas in an information recording area and retaining, in a memory, unallocated area identifying information for identifying at least one unallocated area found by the search (step S31, reading positional information and size information on a free space from non-record section information, see also fig. 2),

determining whether or not an unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information (step S32, asking for the size of the data to be written; and step S33, judging whether writing to a non-record section is possible based on the free space), and

when an unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information, allocating the unallocated area as an area for recording data and recording data into the allocated area (steps S35 and S36, recording of data to the non-record section and changing the corresponding non-record section information).

From this, the subject-matter of claim 1 differs by

searching for a new user file recorded in at least one allocated area,
generating a pointer indicating a position based on an end position of an area in which the new user file is recorded,

wherein the search for unallocated areas is performed from a position following the position indicated by the pointer in a fixed direction.

By starting the search for unallocated areas from an end position of an area in which a new user file is recorded, the time for searching unallocated areas can be reduced.

Document D2 discloses to write new file information in an empty sector of a file information recording area (70) successively and additively after old file information in order to decrease the number of rewrites into the same area of an optical disk. However, the search for an empty sector after old file information is always started from the beginning of the file information recording area (see par. 0043 and 0044 in conjunction with fig. 8, sector number $i=0$, track number $j=0$). Since the file information recording area (70) is small (2048 tracks of 64 sectors) compared to the user data area (80) which corresponds to the "information recording area" of claim 1, there is no motivation to use an additional pointer for starting the search as defined in the claim. Thus, even a combination of the teachings of documents D1 and D2 would not result in the subject-matter of claim 1 which therefore appears to involve an inventive step in the sense of Article 33(3) PCT.

The same statement also applies to claim 13 defining the corresponding recording apparatus.

3. Claims 2-12 and 14 are dependent on claims 1 and 13, respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step. cc 2/97

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(TM) issued by OSTA, etc.) cannot handle the optical disc.

The present invention is provided to solve at least one of the above-described problems.

5

DISCLOSURE OF THE INVENTION

10 The present invention provides a recording method for recording data into an information recording medium, wherein the number of data rewrites into the same area is limited. The recording method comprises performing a search for unallocated areas in an information recording area and retaining, in a memory, unallocated area identifying information for identifying at least one unallocated area
15 found by the search, determining whether or not at least one unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information, when at least one unallocated area satisfying a record request is present among
20 the at least one unallocated areas identified by the unallocated area identifying information, allocating the at least one unallocated area satisfying the record request as at least one area for recording data and recording user data into the at least one allocated area, searching for
25 a new user file recorded in the at least one allocated area, and generating a pointer indicating a position based on an end position of an area in which the new file is recorded. The search for unallocated areas is performed from a position following the position indicated by the pointer in a fixed
30 direction.

When an unallocated area satisfying a record request is determined not to be present among the at least one

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unallocated areas identified by the unallocated area identifying information, the allocating the at least one unallocated area and the recording the user data may comprise returning to the performing the search.

5

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5 The user data may be recorded into the information recording medium on an ECC block-by-ECC block basis, the ECC block may comprise a plurality of sectors, and the search for unallocated areas in the information recording area may be performed on an ECC block-by-ECC block basis.

10 The pointer may indicate an end position of an ECC block containing the end position of the area in which the new user file is recorded.

15 The searching for the new user file may comprise searching user files recorded in the at least one allocated area for a user file having the newest file creation time or modification time as the new user file.

20 The searching for the new user file may comprise searching user files recorded in the at least one allocated area for a user file having the largest ID number assigned to the user file as the new user file.

25 The searching for the new user file may comprise searching user files recorded in a particular directory for a user file most recently recorded in the information recording medium as the new user file.

30 The searching for the new user file may comprise searching for an index file as the new user file, wherein the index file is used to manage information about a list of at least a portion of user files recorded in the at least one allocated area.

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The recording method may further comprises updating the index file when data recorded in the information recording medium is deleted or when the information recording medium is formatted, and recording the updated index file into the area allocated in the allocating the at least one unallocated area and the recording the user data.

The recording method may further comprise generating a pointer indicating a random position in the information recording area. The search for unallocated areas in the information recording area may be performed from a position following the position indicated by the pointer in a fixed direction.

The search for unallocated areas in the information recording area may be performed from a start of the information recording area in a fixed direction.

The present invention also provides a recording apparatus for recording data into an information recording medium. The number of data rewrites into the same area is limited. The recording apparatus comprises a holding section for performing a search for unallocated areas in an information recording area and retaining, in a memory, unallocated area identifying information for identifying at least one unallocated area found by the search, a determining section for determining whether or not at least one unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information, a recording section for, when at least one unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying

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allocating the at least one unallocated area satisfying the
record request as at least one area for recording data and
recording user data into the at least one allocated area;
a searching section for searching a new user file recorded
5 in the at least one allocated area; and a generating section
for generating a pointer indicating a position based on an
end position of an area in which the new file is recorded.
The search for unallocated areas is performed from a position
following the position indicated by the pointer in a fixed
10 direction.

When at least one unallocated area satisfying a record
request is determined not to be present among the at least
one unallocated areas identified by the unallocated area
15 identifying information, the holding section may perform
a search for unallocated areas in the information recording
area and retains, in the memory, unallocated area identifying
information for identifying at least one unallocated area
found by the search.

20 In the recording method of the present invention,
a new search for unallocated areas is not performed until
all of at least one unallocated area found by the previous
search for unallocated areas is used. Thereby, it is possible
25 to avoid concentration of rewrites in a particular area while
avoiding rewriting data into an area from which data has
been deleted. In addition, by performing a search for
unallocated areas from a sector following the end position
of an ECC block, containing the end position of an area in
30 which data is recorded, on an ECC block-by-ECC block basis,
it is possible to prevent rewriting of an ECC block containing
the end position of an area, in which data is recorded, in
an information recording medium into which data is recorded

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using ECC blocks.

5 Further, by searching a new file and generating a pointer indicating a position, from which a search for unallocated areas begins, based on information, such as file management information or the like, it is possible to implement a sequential recording method even in an existing standard file system in which a data structure for recording

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CLAIMS

1. (Amended) A recording method for recording data into an information recording medium, wherein the number of data rewrites into the same area is limited, the recording method comprising:

performing a search for unallocated areas in an information recording area and retaining, in a memory, unallocated area identifying information for identifying at least one unallocated area found by the search;

determining whether or not at least one unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information;

when at least one unallocated area satisfying a record request is present among the at least one unallocated areas identified by the unallocated area identifying information, allocating the at least one unallocated area satisfying the record request as at least one area for recording data and recording user data into the at least one allocated area;

searching for a new user file recorded in the at least one allocated area; and

generating a pointer indicating a position based on an end position of an area in which the new file is recorded,

wherein the search for unallocated areas is performed from a position following the position indicated by the pointer in a fixed direction.

2. (Amended) A recording method according to claim 1, wherein

when an unallocated area satisfying a record request is determined not to be present among the at least one unallocated areas identified by the unallocated area

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identifying information, the allocating the at least one unallocated area and the recording the user data comprises returning to the performing the search.

5 3. (Canceled)

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4. (Amended) A recording method according to claim 1, wherein the user data is recorded into the information recording medium on an ECC block-by-ECC block basis, the ECC block comprises a plurality of sectors, and the search
5 for unallocated areas in the information recording area is performed on an ECC block-by-ECC block basis.

5. (Amended) A recording method according to claim 1, wherein the pointer indicates an end position of an ECC block
10 containing the end position of the area in which the new user file is recorded.

6. (Amended) A recording method according to claim 1, wherein the searching for the new user file comprises
15 searching user files recorded in the at least one allocated area for a user file having the newest file creation time or modification time as the new user file.

7 (Amended) A recording method according to claim 1, wherein
20 the searching for the new user file comprises searching user files recorded in the at least one allocated area for a user file having the largest ID number assigned to the user file as the new user file.

25 8. (Amended) A recording method according to claim 3, wherein the searching for the new user file comprises searching user files recorded in a particular directory for a user file most recently recorded in the information recording medium as the new user file.

30 9. (Amended) A recording method according to claim 1, wherein the searching for the new user file comprises searching for an index file as the new user file.

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wherein the index file is used to manage information about a list of at least a portion of user files recorded in the at least one allocated area.

- 5 10. (Amended) A recording method according to claim 9, further comprising:

updating the index file when data recorded in the information recording medium is deleted or when the information recording medium is formatted; and

- 10 recording the updated index file into the area allocated in the allocating the at least one unallocated area and the recording the user data.

- 15 11. (Amended) A recording method according to claim 1, further comprising:

generating a pointer indicating a random position in the information recording area,

- 20 wherein the search for unallocated areas in the information recording area is performed from a position following the position indicated by the pointer in a fixed direction.

- 25 12. (Amended) A recording method according to claim 1, wherein the search for unallocated areas in the information recording area is performed from a start of the information recording area in a fixed direction.

- 30 13. (Amended) A recording apparatus for recording data into an information recording medium, wherein the number of data rewrites into the same area is limited, the recording apparatus comprising:

a holding section for performing a search for unallocated areas in an information recording area and

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retaining, in a memory, unallocated area identifying
information for identifying at least one unallocated area

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found by the search;

5 a determining section for determining whether or not
at least one unallocated area satisfying a record request
is present among the at least one unallocated areas identified
by the unallocated area identifying information;

10 a recording section for, when at least one unallocated
area satisfying a record request is present among the at
least one unallocated areas identified by the unallocated
area identifying information, allocating the at least one
unallocated area satisfying the record request as at least
one area for recording data and recording user data into
the at least one allocated area;

15 a searching section for searching a new user file
recorded in the at least one allocated area; and

a generating section for generating a pointer
indicating a position based on an end position of an area
in which the new file is recorded,

20 wherein the search for unallocated areas is performed
from a position following the position indicated by the
pointer in a fixed direction.

14. (Amended) A recording apparatus according to claim 13,
wherein when at least one unallocated area satisfying a record
request is determined not to be present among the at least
25 one unallocated areas identified by the unallocated area
identifying information, the holding section performs a
search for unallocated areas in the information recording
area and retains, in the memory, unallocated area identifying
information for identifying at least one unallocated area
30 found by the search.